NURSES OBSERVATIONS AND INTERVENTIONS RELATED TO FLUID AND ELECTROLYTE BALANCE IN PATIENTS HAVING HAD GASTROINTESTINAL SURGERY

by

Carol Lee Walkingshaw

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CHAPTER I

INTRODUCTION

Modern surgical practice is notable for the growing range and magnitude of the operations performed, and for the diminishing mortality and morbidity incidence. Contributing significantly to the diminishing surgical mortality and morbidity is the growing accumulation of knowledge concerning body fluid and electrolyte metabolism. The rapid accumulation of information on fluid and electrolyte metabolism demonstrates the importance of this subject in the metabolic care of the surgical patient. A practical working knowledge of this field is essential for every practicing surgeon.

It is equally necessary for the nurse to be alert to the implications of fluid and electrolyte balance for competent nursing care. Since it is not possible for the surgeon to be with each patient for long periods of time, much of the responsibility for maintaining fluid and electrolyte balance rests upon the observations and care of the surgical nurse.

The patient's comfort and on occasions his survival demand that the surgical nurse be familiar with both the basic facts and the current interventions in fluid and electrolyte balance. Effective therapy requires that the nurse understand the basic principles involved in the therapeutic procedures she performs. Implicit in good post-operative nursing care is the knowledge and understanding of certain basic principles which underly the metabolism of fluids and electrolytes.

This knowledge and understanding is not easily obtained or readily grasped, but if the surgical nurse is to fulfill her role she must work continuously toward improving her competency in this area.

A review of the literature and preliminary observations made on various surgical units has indicated the value inherent in the ability of the nurse to observe and identify correctly the specific signs and symptoms of fluid and electrolyte imbalance. These readings and observations have also pointed up the considerable contribution that can be made to patient care by the nurse who is aware of the frequency of fluid and electrolyte disturbances and their multi-potentiality as a cause of various symptoms. The relative ease and success with which some of these disturbances can be treated when recognized in the mild form give the role of the nurse added practical importance.

Preliminary observations made on some of the surgical units used in the study suggested that even nurses who had the knowledge and background in fluid and electrolyte metabolism offered by a good school of nursing often failed to recognize the presence and/or the significance of symptoms of fluid and electrolyte disturbances. This conclusion was based on the assumption that if the nurses had recognized the symptoms they would have recorded or reported them, which they rarely did.

I. STATEMENT OF THE PROBLEM

The purpose of this study was to investigate the ability of the nurses in a selected sample to observe and identify correctly

specific signs and symptoms of fluid and electrolyte imbalance in patients following gastrointestinal operations. It was hoped that the study might supply answers to two questions. First, did the nurses on the surgical floors selected for study recognize the signs and symptoms of fluid and electrolyte imbalance when no special assistance or guidance was provided for them. Second, when given a list of signs and symptoms of fluid and electrolyte imbalance were the nurses able to recognize these signs and symptoms when only moderate and not severe. This study was also planned to determine whether there would be any significant difference in the actions actually taken by the nurses following their identification of the symptoms with and without a list of actions to be taken.

II. HYPOTHESES

In order to examine the degree of the differences in recognition of signs and symptoms of fluid and electrolyte balance and differences in actions taken, the following hypotheses were formulated and tested by statistical procedures:

1. There will be a significant statistical difference in the ability of the surgical nurses studied to observe and identify correctly certain signs and symptoms of fluid and electrolyte imbalance with and without the aid of a list of these symptoms.

2. There will be a measurable difference in the number of actions actually taken by the nurses following their identification of the symptoms with and without a list of actions to be taken.

3. There will be a significant statistical difference in the number of signs and symptoms recognized by the investigator, a graduate student in medical-surgical nursing, and the number identified by the surgical nurses studied who have, for the most part, little or no formal graduate study.

III. IMPORTANCE OF THE STUDY

The importance of providing patient-centered care is generally accepted and recognized in modern nursing. Meeting the needs of the patient has long been the goal of the nursing profession and recently much has been said and written about giving nursing care which is especially designed to meet the needs of the "whole person". The patient has both physiological and psychological needs which are dependent each upon the other. One of the patient's most fundamental physiological needs is that of proper fluid and electrolyte balance. As mentioned earlier in this report, much of the responsibility for maintaining this fluid and electrolyte balance rests upon the observations and care of the nurse.

The first question considered in this study appeared to be one of primary importance. Only if the nurse recognizes certain signs and symptoms in connection with fluid and electrolyte imbalance can she make her maximum contribution to restoring the patient to health. It is therefore pertinent to determine whether the nurse has adequate knowledge and understanding to make exact and meaningful observations in connection with fluid and electrolyte imbalance. If she does not

usually have this competency, the next step is to determine how she can be helped to develop it.

It was hoped that one of the important outcomes of the study would be improved, more complete and effective patient care. This might be accomplished by assisting nurses in the evaluation and identification of fluid and electrolyte disturbances by providing a tool for the evaluation of the condition of postgastrointestinal surgical patients. Such a tool could be used both in pre-service education and in in-service education of nurses.

IV. DEFINITIONS OF TERMS USED

Surgical nurse. In this study the terms "nurse" and "surgical nurse" are used interchangeably, and refer to all registered nurse personnel working on a surgical unit caring for postoperative gastrointestinal patients. The terms does not refer to licensed practical nurses or to auxillary nursing personnel. It is not used in any way to differentiate between registered nurses according to their preparation. The term refers to all diploma, associate, and bachelor degree nurses working on the above described units.

Fluid and electrolyte balance. This term refers to the proper distribution, volume and concentration of fluids and electrolytes in the body. It is another way of expressing acid-base equilibrium and is used interchangeably with the terms "fluid and electrolyte metabolism" and "homeostasis".

V. DELIMITATIONS AND LIMITATIONS

This research was confined to seven surgical units selected from three general hospitals. Three of the units were contained in one private hospital, one of the units used was in a county hospital, and the remaining three units were in a second private hospital. All three hospitals used in this study were located in the same city. The surgical units selected for this investigation were chosen because of the number of postoperative gastrointestinal patients served by them.

The population studied consisted of twenty-two nurses caring for fifty-six patients of the type selected. The patient population used ranged from five to ten per unit. The diagnoses of the patients ran the whole gamut of gastrointestinal surgical problems, from those frequently seen to the unusual. The nursing personnel population varied from two to five nurses per unit. Fifteen of the nurses fell into the twenty to thirty year age group, two into the thirty to forty year age group, three in the forty to fifty age group, one in the fifty to sixty year age group and one was in the sixty or above age group. There were three nurses from associate programs, fifteen from diploma programs and four from generic baccalaureate programs.

The chief limitation of this study was dependence upon the skill and ability of the investigator to evaluate properly the selected patients in relation to certain signs and symptoms of fluid and electrolyte imbalance. Another limitation was the necessity of

constructing and using an untried tool. The varying backgrounds of the nurses involved in the study may also have resulted in certain limitations.

The patients used in this investigation were selected only on the basis of their diagnoses and not on the severity of their illnesses. The relatively small number of patients with postoperative gastrointestinal diagnoses served as a major limitation, and necessitated the use of the three different hospitals. This limitation was further complicated by the limited number of registered nurses used to staff the units. It was necessary to include the seven divisions in this study in order to have more than twenty registered nurses participating.

The discussion and analysis of the findings were based upon the observations and reasoning of only one person, the researcher of this project, and have not been subjected to further examination or validation.

A final limitation of the study was the total lack of previous published nursing research in this area. As far as could be determined by the investigator, this study was a pioneer effort.

CHAPTER II

REVIEW OF LITERATURE

A review of the literature indicated a growing medical interest in and awareness of fluid and electrolyte disturbances in postoperative patients. In recent years much has been written about fluid and electrolyte balance in general, and some writing has been published in regard to the patient who has had gastrointestinal surgery. Little, if anything has been published concerning the implications fluid and electrolyte balance has for nursing care. The investigator could find only one nursing study which was in any real way related to this problem. This study was a master's thesis concerned with compiling a selected bibliography of fluid and electrolyte sources for nurses.[1] The investigator was unable to find any other published or unpublished nursing studies or monographs dealing with this subject. The League Exchange No. 36 dealt with fluid and electrolyte metabolism as a teaching unit for student nurses. A description of this work can best be given by quoting from it.

> This unit will be most useful to the instructor teaching students who have had a good background in anatomy and physiology, as well as in chemistry--specifically, the nursing students in their senior year. With their general background in the clinical area, they should have a greater insight into the nursing implications in the care of patients with fluid and electrolyte imbalance or with an impending imbalance.

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[1]Lottie T. Jayjock, "A Selected Annotated Bibliography of Fluids and Electrolytes for Nurses," unpublished master's dissertation, School of Nursing, The Catholic University of America, 1958.

> Principles of the body's normal regulatory mechanisms... were identified and served as a basis for the development of this resource unit. The instructor in any clinical area... may adapt these principles according to the patient needs which she is assisting the students to interpret.[2]

This work is excellent and serves its purpose well. However, it is only an outline and touches two of the body's systems briefly. It was meant to serve only as a guide to instructors of basic nursing students and though interesting, it did not meet the needs of this study.

During the past five years there have been a number of articles centered around fluid and electrolyte balance which have been published in the various nursing periodicals. They have, for the most part, been primarily concerned either with intake and output records or with elementary and simplified physiology. One of them did, however, attempt to show its reader a few implications for nursing care. It, too, began with simplified physiology, but it went on to describe briefly the functions of water, glucose, salt, and protein in fluid balance. It spent two paragraphs on the importance of keeping records but finally concluded with a few of the implications fluid balance holds for nursing care. These implications were interspersed throughout the concluding four paragraphs of the article but could be differentiated from the topic of bedside observations if selected out by the reader.[3]

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[2]Graduate Students, "Fluid and Electrolyte Balance - A Teaching Unit," The League Exchange No. 36, National League for Nursing, 1959, p. 1

[3]Robert Elman, "Fluid Balance from the Nurse's Point of View," American Journal of Nursing, 49: 4, April 1959.

Earlier than five years ago, little is to be found in nursing literature concerning fluid and electrolyte balance. Indeed, prior to fifteen years ago, this subject held little interest for the medical practitioner. Since that time much has been written by physicians on the topic. Because of the great amount of material and its depth, medical science has provided the researcher with most of the background data and literature for this project.

The clinical imbalances of the body fluids and electrolytes constitute a subject which is both complex and extensive. Although many differences can be found between sources, they are in agreement on most major points. For these reasons only a small number of the best references will be reviewed in this report. Some were selected because they either directly or indirectly indicated that the nurse could contribute to patient care by assuming the full responsibility of her role. Others were selected for reviewing because they substantiated some part of this study or provided some background for it.

Dr. Elkinton and Dr. Danowski break down the history of fluid and electrolyte literary contributions into three periods of development (1) the century preceding World War I, (2) the period between World Wars I and II (1918-1941), and (3) the present period which began during the last war. It was in the first of these periods that parenteral fluid therapy was pioneered. Analytical methods by biochemists prepared the way for the next period.[4]

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[4]Russell Elkinton and T. S. Danowski, The Body Fluids, The Williams & Wilkins Company, 1955, p. viii.

The second period began with the field of physiological chemistry's understanding of the body's defense of neutrality. During this period the field of clinical investigation developed. The techniques and knowledge of the laboratory were taken to the bedside of the patient. This was the era of such men as Gamble, Peters, and Van Slyke. At the same time, men in the basic sciences of biochemistry and physiology made great progress in understanding the dynamics and regulation of the body fluids.[5]

The present era began with the development of atomic energy during World War II. Thus far, this era has been notable for the vast expansion of research. This is emphasized by observing that in 1934, forty-eight papers on subjects in this field appeared in two prominent journals. Twenty years later, in 1954, one hundred and thirty-two papers were published in the same two journals. At least part of the credit for this expansion has been given to the development of the flame photometer and to radioactive isotopes which are used to determine constituents in the body fluids.[6]

The areas which were considered in the review of literature for this project were (1) the general considerations of fluid and electrolyte balance, (2) body fluid problems in surgical patients, and (3) the problem of fluid losses in gastrointestinal surgical patients.

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[5] Ibid.

[6] Ibid., pp. viii-vix.

These three areas determine, to a large degree, the response of the gastrointestinal patient to surgery and the rationale of the therapeutic procedures ordered by the surgeon. These three areas should, therefore, determine the functions that the nurse performs for or in behalf of the patient.

Since much of the responsibility for maintaining water balance, particularly in the seriously ill patient, rests upon the observations and care of the nurse, she should understand the principles underlying the metabolism of body fluids and electrolytes and be aware of the practical problems involved. What the nurse does, or is able to do, is influenced by what she has been educated to do. This is, in turn, influenced by what medical science has learned about fluid and electrolyte metabolism.

Water and electrolyte balance in surgery. In an article published in 1952, Dr. Randall made the following statement:

> ...The term "balance" implies an equilibrium among two or more different things. Maintaining fluid and electrolyte balance requires an understanding of the normal daily intake and output of water and of the major electrolytes required for body economy....Before undertaking major surgery it is often wise to determine what the particular patient's normal electrolyte values are because of the range of some of the normal values....A thorough understanding of normal averages and ranges is essential to evaluate properly changes in the patient's status pre- or postoperatively....[7]

In the ten years since this statement was written, articles and books have been published in an effort to increase the understanding of normal fluid and electrolyte metabolism. During this

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[7]Henry T. Randall, "Water and Electrolyte Balance in Surgery," Surgical Clinics of North America, April, 1952.

period of time, much has also been written about fluid and electrolyte disturbances.

Dr. Elkinton and Dr. Danowski have concluded from detailed studies the following:

> ...surgical procedures with the comcomitant anesthesia produce a train of metabolic changes. These are set in motion by the events attendant upon surgery, i.e., by the trauma of section and dissection, and by the starvation and immobilization which are present in greater or lesser degree. It is likely that there are in addition other as yet unidentified factors, psychogenic and physiologic, which also serve as stimuli. This mass of known and unknown stimuli in turn sets off responses in which the role of at least the adrenal cortex has been identified.... The end result of the interaction of this mass of stimuli and the group of responses includes the following series of changes:
>
> a) elevation of the body temperature
> b) rise in the pulse rate
> c) diminution in urine volume
> d) increased urinary output of nitrogen
> e) increased urinary output of potassium
> f) decreased urinary excretion of sodium
> g) loss of weight suggestive of a decrease in body fat[8]

Although these are normal responses to surgery, medical science indicates that it is important for them to be recognized. They should be observed and noted so that if they are not self-limited they can be controlled before they become severe. Special attention should be paid to the patient who had a pre-existing disturbance prior to surgery, or to the patient in whom complications developed during the surgical procedure or to the patient who has an additional underlying disease.

In patients who have had gastrointestinal surgery, special attention should be paid to those who have continued gastric or

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[8] Elkinton and Danowski, op. cit., pp. 456-457.

intestinal intubation and/or drainage, and to those who have diarrhea or vomiting.

It is important that the surgical nurse realize that major surgical operations are usually first followed by hyperkalemia which may, in turn, be followed by considerable potassium loss and serious hypokalemia. Even anesthesia itself may depress the plasma potassium. The nurse should also be aware of the generally known information that anesthetics, analgesics, barbituric preparations, pain, et cetera, all common in connection with surgery, may depress diuresis.

SUMMARY

From the review of literature it was concluded that the past fifteen to twenty years has seen a vast increase in both the amount and the quality of research being conducted by medical and associated sciences in the area of fluid and electrolyte metabolism. Even with this increase in medical research it is evident that there is much yet to be discovered about this subject.

Literature also indicated that more on this subject has been written in nursing journals in the past five years than ever before. This nursing literature is becoming more significant and more importance is being attached to it. However, there are few nursing research studies or monographs concerned with fluid and electrolyte balance. Those that have been published deal mostly with intake and output records.

It is apparent that nursing has not yet caught up with medical science in this area and that no major research has been done

concerning the implications that fluid and electrolyte metabolism has for the nurse. Much nursing research in this area needs to be done if expert nursing care is to parallel expert medical and surgical treatment of patients.

CHAPTER III

METHOD

The data for this study were derived from comparisons of observations recorded by twenty-two nurses on surgical units both before and after they had been provided with a tool for the evaluation of specific signs and symptoms of fluid and electrolyte imbalance in postoperative gastrointestinal patients. Nurses' observations made when using the tool were also compared with the observations of the same patients on the same by made by the investigator using the tool. Actions taken by the nurses in regard to the symptoms manifested by the patients when the nurses had no key to the tool used were compared with actions taken when the nurses had the assistance of a key to the tool.

Description of the sample group. As mentioned earlier, the population of the selected group consisted of twenty-two registered nurses working on surgical units serving from one to ten postoperative gastrointestinal patients. The nurses came from all current types of nursing programs with the exception of general nursing programs leading to the baccalaureate degree. Three of the nurses had been prepared by associate degree programs, fifteen by diploma programs, and four were graduates of generic baccalaureate programs. The ages of the nurses in the sample fell predominantly into the twenty to thirty year age group with fifteen of the twenty-two within this range. Two nurses comprised the thirty to forty age group, three the forty to fifty, one the fifty to sixty, and one the sixty or above

age group. None of the nurses studied had completed any graduate work in nursing although a few had taken university courses unrelated to nursing.

In order to select a sample of at least twenty registered nurses, it was necessary to conduct this study in three different general hospitals. Of the seven units included in the investigation, three were in one private hospital, three in a second private hospital, and one in a county hospital.

The nurses cared for fifty-six gastrointestinal patients who had had surgery, and the patients were located in varying numbers from five to ten on the seven surgical units. Each unit staff included from two to five of the nurses in the sample studied.

Instrument used in the study. In order to answer the questions raised in the study it was necessary for the investigator to construct and develop a suitable tool. As indicated in the review of literature, the investigator was unable to locate any nursing studies concerned with fluid and electrolyte imbalance in postoperative patients. This was also true of the attempt to locate a tried and proved instrument for evaluating the fluid and electrolyte status of patients. After several attempts and conferences with faculty teaching on graduate programs in nursing, the researcher developed a tool which promised to elicit answers to the questions of the study.

One sheet of the instrument was made up of blank spaces which were numbered and organized under the headings of (1) name of patient, (2) room, (3) diagnosis, (4) symptoms and conditions observed which the nurse believed to be related to fluid and electrolyte balance,

and (5) actions (actually) taken by the nurse in response to fluid and electrolyte imbalance. The sheet also provided a blank in which the nurse could indicate the type of nursing education program from which she had been graduated.

The second sheet consisted of two general sections. It was actually a key to the first sheet. Symptoms and conditions related to fluid and electrolyte balance in the gastrointestinal surgery patient were listed on the top half of the sheet. They were grouped according to the following headings: (1) symptoms of chloride deficiency, (2) symptoms of dehydration, (3) symptoms of potassium deficiency, and (4) symptoms of sodium deficiency. The lists under each heading were abstracted from lists of symptoms on which the authors listed in the bibliography were in agreement. The bottom half of the page listed possible actions which current medical literature and the judgement of the investigator and her nursing consultants indicated as appropriate in the presence of specific fluid and electrolyte disturbances. These sheets which made up the instrument used in this study may be found in the appendix of this report.

Collecting the data. Following the development of the instrument and a trial run of its use on one surgical unit, meetings were held with the directors of nursing services and the surgical floor supervisors at each of the three hospitals involved. Their permission and cooperation for conducting the study were obtained. With their assistance, arrangements were made for the administration of the instrument on the days and afternoons on which the units

were staff with the most nurses. These days were those when the postoperative patient load was expected to be heaviest. The selected nurses would probably be caring for more postoperative gastrointestinal patients on these days.

The nurses on the units were not contacted by the investigator prior to the administration of the instrument. The supervisors instructed the head nurses of the division to expect a graduate student on the previous arranged date and to give her full cooperation with her project. This is all the information the respondents received prior to the study.

On the appointed day, the investigator went to the hospital an hour before report and listed the names, rooms and diagnoses of the gastrointestinal patients who were postoperative on two of the instrument's first sheets for every registered nurse scheduled to work on the unit that day. During report the researcher passed out one of the first sheets of the instrument to each nurse. Then the investigator told the group that she needed their help in developing a tool for the improvement of nursing care to postoperative patients and that the instrument was being judged and not the nurse. The researcher continued then to read the rest of the instructions for the use of sheet number one. The nurses were instructed to fold the sheet and carry it with them as they went about their usual nursing duties. They were asked to write in the proper column any symptom or condition related to fluid and electrolyte imbalance of the patients listed which they noted in the course of their usual morning activities. Any actions actually taken by them in connection with the listed

symptoms were also to be recorded in the appropriate column. The nurses were further instructed that the sheets would be collected half way through the shift (11:00 a.m. in most cases) at which time they would receive another tool to evaluate. Before completing the conference with the nurses they were asked to go about their duties as they usually did so that they would not in any way influence the study in favor of one tool or the other. They were also cautioned that discussing the information on the sheets with one another would be a serious handicap to the development of a "true" tool.

When the test instrument was administered on trial run on a unit (not one of the seven included in this study) the researcher was asked why certain patients were listed while others were not. This was especially true when there was a patient who was not a postoperative gastrointestinal patient but who was more critically ill than those on the list. Because of this experience, the investigator added to the written directions she read to the sample of nurses on the units in the study the following information: The number of patients listed was kept to a minimum so that nurses would not feel burdened or robbed of time by helping to develop a tool for the improvement of nursing care, and that for the sake of simplicity it had been decided that only postoperative gastrointestinal patients would be placed on the list.

The reading of these instructions aloud to the nurses went very rapidly and was always done twice for each group. No other instructions were given and the investigator left the floor to avoid

being trapped into further discussion with the nurses which might influence the results.

At the half way point of the shift the investigator returned to the unit and met briefly with the selected registered nurses. Eleven o'clock was the ideal time during the day shift because the unit by this time was usually running smoothly, the nurses ordinarily had done some charting, and none of them were off to lunch or taking "coffee breaks". Meeting with them at this time was usually convenient for them, too, so they seemed to be more cooperative and willing to participate than did the nurses on the afternoon shifts when the half way point fell at the beginning of the busiest part of the shift.

During the meeting with the nurses at the half way point of the shift, the first copy of page one of the instrument was collected. As the investigator received these sheets, she checked them for correctness of the date, unit, and identification number and made sure the nurse had indicated the type of preparatory nursing education she had had.

Next, the nurses were given a second copy of page one of the instrument. It was exactly the same as copy one had been except that the name, room and diagnosis of the patients listed were carbon copies which were made at the same time as the first to save time. Before going on, the researcher checked that the correct identifying number was on the second copy of page one of the instrument. Since no names were used in this study, this was the method used to safeguard the accuracy of the results and prevent mixups. If left

until the end of the shift, mistakes would be more likely to take place in the confusion of changing shifts. The researcher also used this time to estimate the age of the individual nurse within ten year ranges.

The key sheet or page two of the instrument was passed out at this time. The nurses were instructed to continue to perform their nursing activities as they did normally. It was suggested that they read the key sheet once before assuming their previous duties so that they would have the information in mind more or less while working. The instructions read to the nurses by the researcher asked them to use the key in evaluating the fluid and electrolyte disturbances manifested by the patients on their list. The researcher illustrated how the key could be used by describing a fictitious patient with a fictitious symptom. She placed the letter which was in front of the symptom in the column under the appropriate heading instead of writing out the symptom. Next she placed the number of an action listed on the key, under the column headed "Actions Taken by Nurse". She explained that letters representing more than one symptom or numbers representing more than one action should also be used in this manner instead of filling in the word.

During the last half of the shift, the researcher also used the key to evaluate the patients being evaluated by the nurses participating in the study.

Because the instrument used in this study was developed by the researcher it was thought advisable to describe the collection of data in greater detail than would have been appropriate had a proved tool been used.

Statistical method. After forms had been filled out on each unit, the results were tabulated in the following way: (1) Each observation form made without the assistance of the key was evaluated according to the key. Only those observations made without the help of the key which were the equivalent or the same as the symptoms listed on the key were tabulated. The others were not counted to simplify statistical analysis. (2) Each action listed on the tool without the key was evaluated according to those appearing on the key. Those actions listed that were not the same or equivalent to those of the key were not tabulated.

Separate tables were made listing the number of signs and conditions observed by the nurses individually without the key and with the key. Two separate tables were also compiled listing the number of actions taken by the nurses without the key and with the assistance of the key. Finally, a table was set up listing the number of observations of symptoms of fluid and electrolyte disturbances made by the researcher with the key as the basis of the observations.

Using the correlated "t" test to compare the differences between the number of symptoms identified before and after the nurses had use of the key, it can be said with confidence that the nurses with the key noted significantly more symptoms and conditions related to fluid and electrolyte balance than when they did not have use of it. "t" = 10.272 and is significant at .001 level.

The same test was used to compare the differences between the number of actions actually taken by the nurses following their

identification of the symptoms with and without the key. From the results ("t" = 11.000, significant at .001 level) it can be concluded that the nurses with the key took significantly more actions than when they did not have the key.

In using the correlated "t" test to compare the difference in the number of signs and symptoms recognized by the investigator, a graduate student in medical-surgical nursing and the number identified by the surgical nurses, mostly graduates of diploma programs, "t" = 15.152 and is significant at .001 level. In conclusion, it can be said that the investigator noted significantly more symptoms of fluid and electrolyte imbalance than did the nurses with the key.

In using the correlated "t" test the following formula was used:

$$t = \frac{\overline{D}}{\sqrt{\frac{\sum D^2 - \frac{(\sum D)^2}{N}}{N-1}}{N}}$$

D = the difference between the number of symptoms identified or the actions taken.

CHAPTER IV

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Current trends in medical science are directed toward an even greater expansion of research into the field of fluid and electrolyte metabolism. The past fifteen to twenty years saw a vast increase in both the amount and the quality of research but there is much left to be learned about this subject which is both highly complex and extensive. There are many differences yet to be resolved. Great importance has been attached by the physician to the diagnosis and treatment of patients with water, electrolyte, or acid-base disturbances. It is now recognized that these disturbances are not rare, as once believed, but occur rather commonly and cause many unnecessary deaths.

The nursing profession has been slower to move into the field of fluid and electrolyte dynamics. However, more on this subject has been written in the nursing journals in the past few years than ever before, and more importance and significance is being attached to this area. Presently there are few medical research studies concerned with fluid and electrolyte balance, and none are concerned with the implications this field has for nursing care. It is reassuring to note, however, the new importance nursing education is giving this subject and the prominent position it is moving into in the new advanced nursing curricula. It is hoped that nursing students of the future will learn to recognize the significant role nurses can play in the maintainence of fluid and electrolyte balance in the

patients cared for and that they will have the knowledge and ability to observe and identify correctly signs and symptoms of even mild imbalance.

This study represents the attempt of the investigator to determine the ability of the nurses now staffing selected surgical units to observe and identify correctly specific signs and symptoms of fluid and electrolyte imbalance often manifested in patients who have had gastrointestinal surgery and to institute appropriate action for the welfare of the patient. An attempt was also made to determine if a lack of knowledge and understanding in this area could be partially compensated for when the nurses were assisted by lists of certain symptoms to watch for in their patients and list of appropriate actions to take.

Statistical analysis of the results of the study was done using the correlated "t" tests. The results may be seen in the table below.

TABLE I

RESULTS OF THE STUDY

Comparison Groups	df	t
Differences between actions taken by nurses without and with a list	169	*11.000
Differences between symptoms observed without and with a list	169	*10.272
Differences between symptoms observed by investigator and nurses with the list	169	*15.152

*P < .001

The probability of rejecting a true hypothesis is one time in 1,000. The groups compared are very significantly different and the chance that they would not be different is only one time in 1,000.

CONCLUSIONS

The findings of this study led to several conclusions which have obvious significance for those concerned with complete and effective patient care, especially for those responsible for post-operative gastrointestinal patient care.

First, the data resulting from this study was very consistent with the first hypothesis, that nurses would observe significantly more signs and symptoms of fluid and electrolyte balance with a list of possible symptoms than without such a list. There was a very significant statistical difference in the ability of the surgical

nurses studied to observe and identify correctly certain signs and symptoms of fluid and electrolyte imbalance with the aid of a key or list of these symptoms. Second, there was a significantly measurable difference in the number of actions actually taken by the nurses following their identification of the symptoms and conditions when a key or list of possible actions to be taken was at hand than when none was provided. Finally, the findings of this study are consistent with the third hypothesis. There was a significant statistical difference in the number of signs and symptoms recognized by the investigator, a graduate student in medical-surgical nursing, and the number identified by the surgical nurses studied who have, for the most part, little or no formal graduate study.

OTHER CONSIDERATIONS

The findings of this investigative study have provided information that can be of assistance to those who are responsible for the care of patients having gastrointestinal surgical procedures, and perhaps for those who are responsible for the care of all types of patients. The information should be helpful to those in supervisory positions in planning in-service education programs designed to improve patient care and increase the knowledge and ability of nursing personnel. This research project has also provided data relative to the present level of patient care and nursing performance and, therefore, supplies a basis for the evaluation of the effectiveness of pre-service and in-service nursing education programs in this field.

The findings of this research project failed to find enough correlation to warrant drawing any conclusions based upon either the ages of the nurses included in the study or in their preparation. Fifteen of the nurses, or about seventy-five per cent of them, were graduates of diploma programs. Three were graduates of associate degree programs and four were graduates of generic baccalaureate programs. The numbers of nurses from associate degree and baccalaureate degree programs were too small to permit the drawing of valid conclusions. Fifteen or about seventy-five per cent of the nurses studied were between twenty and thirty. The numbers at other ages were too small to make comparisons of groups on the age basis fruitful.

RECOMMENDATIONS

It is upon the conclusions of this study that the following recommendations are made:

1. Research of this type should be conducted again using the same instrument and hypotheses but in a larger setting where there could be more careful sampling of the nurses and patients included in order to prove or disprove the value of the tool and lead to its improvement.

2. Comparison of fairly large groups of diploma, associate degree, baccalaureate degree and possibly even master's degree graduates should be done using this tool to determine what differences in quality of nursing care may result from nurses with different educational background.

3. Age group differences should be more extensively investigated. Possibly twenty to thirty years is too wide a span and groups should be studied twenty to twenty-four and twenty-five to twenty-nine. What is taught now in nursing schools differs considerably from what was taught ten to twelve years ago, when the thirty-year-olds were in school.

4. A tool such as the one in this study should be tried out in both pre-service education and in-service education of nurses and its influence on patient care determined.

5. Signs and conditions such as those in this research project might be attached to the charts of all gastrointestinal surgery patients and routine checking for these symptoms be carried out on each shift for the first forty-eight hours, at which time this practice would be discontinued unless the condition of the patient warranted its continuation.

6. Further research should be done in regard to the implications of fluid and electrolyte balance for nursing in all services and specialities of nursing such as on medical or thoracic units.

7. This study has implications for curriculum building in both the science and the clinical areas. It is recommended that this and similar studies be reviewed in connection with efforts to improve the science content of basic and graduate programs in nursing.

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APPENDIX A

RAW DATA

Test Used: Correlated "t" test

Formula:

$$t = \frac{\overline{D}}{\sqrt{\frac{\frac{\Sigma D^2 - (\Sigma D)^2}{N - 1}}{N}}}$$

Values For:

Differences between actions taken by nurses without and with a list:

$N = 170$
$\Sigma D = 374$
$\overline{D} = 2.20$
$D^2 = 1974$
$(\Sigma D)^2 = 139,876$

Differences between symptoms observed without and with a list:

$N = 170$
$\Sigma D = 269$
$\overline{D} = 1.582$
$D^2 = 1109$
$(\Sigma D)^2 = 72,361$

Differences between symptoms observed by investigator and nurses with the list:

$N = 170$
$\Sigma D = 438$
$\overline{D} = 2.576$
$D^2 = 1960$
$(\Sigma D)^2 = 191,844$

APPENDIX B

DATE_____
FLOOR_____
2 YEAR GRADUATE_____
3 YEAR GRADUATE_____
4 YEAR GRADUATE_____

I.		II.	III.	IV.
NAME OF PATIENT	ROOM	DIAGNOSIS	SYMPTOMS & CONDITIONS RELATED TO FLUID AND ELECTROLYTE BALANCE	ACTIONS (ACTUALLY) TAKEN BY NURSE
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				

III. SYMPTOMS AND CONDITIONS RELATED TO FLUID AND ELECTROLYTE BALANCE

Symptoms of Chloride Deficiency

A. Lethargy and/or Drowsiness
B. Hallucinations
C. Cyanosis
D. Decreased Respirations
E. Muscle Spasms
F. Coma or Convulsions

Symptoms of Dehydration

G. Scant, Concentrated Urine
H. Dry Mucous Membrane (tongue)
I. Fever and/or Thirst
J. Skin Turgor (poor)

Symptoms of Potassium Deficiency

K. Muscular Weakness
L. Stiffness
M. Paralysis of Respiratory Muscles
N. Paralytic Ileus (no bowel sounds) and/or Distention
O. Bradycardia

Symptoms of Sodium Deficiency

P. Apathy
Q. Anorexia
R. Nausea and/or Vomiting
S. Soft Pulse
T. Hypotension
U. Tachycardia
V. Dry Tongue
W. Syncope (fainting)
X. Uremia

IV. ACTIONS (ACTUALLY) TAKEN BY THE NURSE

1. Accurate measurement of <u>all</u> intake and output

2. Accurate recording (chart) of all intake and output

3. Accurate measurement of some part of intake and output (eg. noting amount of vomitus or levine drainage)

4. Accurate recording (chart) of a <u>part</u> of intake and output (eg. recording amount measured or approximated on chart)

5. Noting and recording the <u>nature</u> of the intake and/or output either in part or completely. (eg. noting and recording the <u>nature</u> of vomitus or <u>nature</u> of levine drainage)

6. Levine tube irrigated with normal saline to prevent dilution of electrolytes

7. Oral intake limited for patient(s) with suction so that fluids wouldn't dilute electrolytes and wash them from stomach

8. Oral intake encouraged by nurse (diet and/or fluids)

9. Frequent interval feedings of fluids given or directed to be given to patient

10. Symptom(s) and/or condition(s) reported to doctor(s) on rounds (or when he is visiting patient)

11. Symptom(s) and/or condition(s) reported to doctor directly (usually by phone call) when first observed.

12. Symptom(s) and/or condition(s) reported to nurse in charge

APPENDIX C

POPULAR TEACHING MATERIALS

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